5.17 CALCULATIONS

5.17.01 ABSOLUTE VOLUME AND PERCENT OF VOIDS IN A UNIT VOLUME OF AGGREGATE

(a) Scope.

This method covers the procedure for calculating the volume of space occupied by the aggregate particles and the voids in a unit volume of aggregate.

(b) Procedure.

(1) The unit weight of the aggregate shall be determined by Kansas Test Method KT-5. The specific gravity of the aggregate shall be determined by Kansas Test Method KT-6.

(2) Volume of Aggregate Particles: Calculate the absolute volume of space occupied by the aggregate particles by the following formula:

SI Formula:

$$A_s = \frac{W_{sm}}{Sp.\ Gr.\ (997)}$$

English Formula:

$$A_s = \frac{W_s}{Sp.\ G.\ x 62.24}$$

Where:

A_s	=	Absolute volume of the aggregate.
W_s	=	Weight of the unit volume of aggregate in pounds.
W_{sm}	=	Weight of the volume of aggregate in kilograms (kg)
Sp.G.	=	Specific Gravity of the aggregate. (Saturated-Surface Dry condition, unless otherwise specified)

Example: Unit weight of aggregate is normally expressed in kilograms per cubic meter (pounds per cubic foot). Therefore, one cubic meter (cubic foot) is used in this example.

W_{sm}	=	Wt. of 1 cu. meter of aggregate = 1762 kg.
W_s	=	Wt. of 1 cu. ft. of aggregate = 110 lb.
Sp.G.	=	2.65

SI Example:

$$A_s = \frac{1762}{2.65(997)} = 0.667\ cu.\ meter$$

English Example:

$$A_s = \frac{110}{2.65x62.24} = 0.667\ cu.\ ft.$$

or 0.667 x 100 = 66.7 percent of the total volume is occupied by the aggregate.

(3) Volume of Voids: Since the aggregate occupies 0.667 cu. meter (cu. ft.) the volume of voids is:

1.000 - 0.667 = 0.333 cu. meter (cu. ft.) or:
0.333 x 100 = 33.3 percent of the total volume is voids.